(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 394 785 A1**

(12) EUROPEAN PATENT APPLICATION

(21) Application number: 90107133.2

(51) Int. Cl.5: B28C 7/00, B28C 9/00

(22) Date of filing: 13.04.90

The application is published incomplete as filed (Article 93 (2) EPC). The point in the description or the claim(s) at which the omission obviously occurs has been left blank.

(30) Priority: 26.04.89 IT 4683189

(43) Date of publication of application: 31.10.90 Bulletin 90/44

(84) Designated Contracting States: AT BE CH DE DK ES FR GB GR LI LU NL SE

(71) Applicant: SAMI S.N.C. DI BERTOLINI CLAUDIO & C.
via Bosco, 23/D
I-42019 Scandiano (Reggio Emilia)(IT)

(72) Inventor: Bertolini, Claudio
Via Bosco 23/D
I-42019 Scandiano, (Reggio Emilia)(IT)

(74) Representative: Lecce, Giovanni
Dott. Giovanni Lecce & C. S.r.l. Via G. Negri 10
I-20123 Milano(IT)

(54) Means and process for automatic coloring of concrete.

(57) A process for the coloring of concrete comprises an automatic programmable plant in which, from some microbatchers (2), the batches of coloring products are weighed with an electronic balance (5) which supports a conveyor belt (3) used to discharge said batches in a container (6) with mixer (7) with motor (8).

In the container (6) the batches of colorants are prediluted in water then discharged in the concrete mixers in which the concrete mixed with the necessary aggregates is already present.

A second batch of water, useful to complete the final mix of colored concrete, is subsequently discharged in the container (6), along the drain valve (12), the suction pump (13) and the channel (11) with the main object of washing the plant and preparing it for the following mixing operations, possibly different as regards batches and/or components.

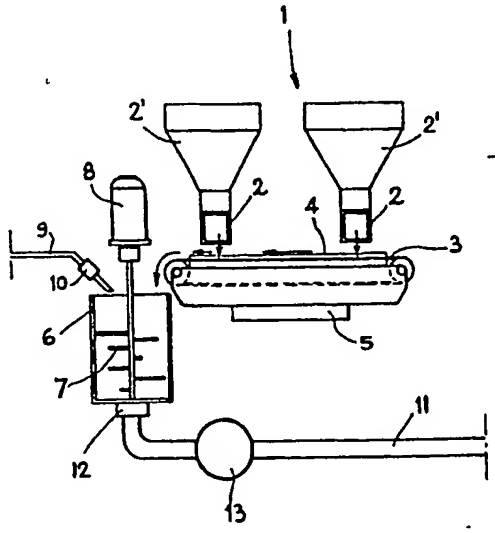

Fig. 1

EP 0 394 785 A1

The invention concerns means and process for automatic coloring of concrete, comprising at least one conveyor belt with balance, combined with batchers with hoppers, having its discharge side positioned on a container with mixer to which leads at least one water supply channel and at least one drain channel on which at least one vacuum pump is positioned.

It is known that the coloring of the concrete is at present obtained through the use of inorganic synthetic pigments, like iron oxides, chrome oxides and the like.

The first, which are used to obtain the colors red, yellow, black, brown and their shades, and the second, which are used to obtain green, and at any rate inorganic synthetic pigments in general, are substantially added to the cement and aggregates directly in the concrete mixers.

According to a first process, the dry oxides in powder are added by hand on the basis of volumetric evaluations and measurements. This method of proceeding is, however, very empiric and the chromatic result depends exclusively on the experience of the operator who prepares the mix.

For these reasons, it is difficult that the productions are homogeneous or identical, as the dry oxides in powder are added with ratios in volume, and these volumes necessarily vary also with the type of oxide, its state of preservation, temperature conditions, humidity etc.

Another problem consists in the fact that the yield of these mixes is much lower than the real possibilities, due to the high volatility of the oxides and to their easy dispersion in air during the additions.

Another problem consists in the fact that, in the dry mixes, it is impossible to completely and optimally exploit the oxides as the particles, besides dispersing easily in air, are not homogeneously fixed with those of the cement. According to another coloring method presently used, the oxides are prediluted in water by the producing companies; this system, although it permits a better yield and homogeneity of the mixes, also presents some particular problems, first of all the fact that the prediluted products are packed in drums, or at any rate very bulky containers, for which storage is necessary, with consequent increased costs of packing, transport, storage and of any recycling or disposal of the throwaway containers.

Another problem consists in the fact that the prediluted oxides create particular pollution problems, as, once a change of color is required, it is necessary to wash all the pipes, pumps and plants in general, with subsequent drainage of the water in sewer due to the fact that it is difficult to work in the presence of purification systems.

Another problem consists in the high costs of the products as fluidizing and deflocculating additives are present in them to prevent the decantation of the oxide particles and keep them suspended.

To all this is added the fact that for such needs are indispensable special liquid batching plants, comprising sophisticated components like probes, displacement pumps etc. This method, finally, lends itself to incorrect speculations since, at equal volume yield, it is possible to dilute in water smaller quantities of dry oxide powder than those declared and considered to establish the prices of the prediluted products.

The object of the present invention is to eliminate the above problems.

The invention, as characterized by the claims, solves the problem by means of means and process for automatic coloring of concrete, through which the following results are obtained: the oxide mixes are produced automatically, with precise, repetitive batches; the predilution of the oxides is carried out inside a container with mixer in which the water has also the subsequent function of washing of all the parts that have come into contact with the products; the prediluted oxides are sent automatically to the concrete mixers in which the cement and aggregates are already being mixed; subsequently, after the mixing of the cement-aggregates with the prediluted oxides, a further batch of water is sent into the container with mixer, necessary to complete the total, final mixing, which operates a washing action of all parts.

The advantages of the present invention mainly consist in the fact that, besides the homogeneity and uniformity of the mixes, it is possible to vary automatically the quantity of coloring oxides and mix them together to obtain any special effect, e.g. streaks and imitation of colour which are obtained in the baking of brick products, and to obtain constant, optimal chromatic yields of colour.

Another advantage consists in the fact that the quantities of coloring oxides are accurately controllable by the programmed weighing systems.

Further advantages consist in the fact that the washing water of the plants is no longer present, as this operation is carried out in the last phase of mixing, all the operations take place automatically and according to pre-established programs, and the storage of the raw materials, i.e. of the oxides, is carried out in traditional manner, with limited dimensions and costs.

The invention is described in more detail below according to a preferred and unbinding construction, with reference to the enclosed drawing, in which:

fig. 1 shows a predilution plant of the coloring oxides, in schematic lateral view, and

fig. 2 shows the same plant, viewed sche-

matically in plan. The figures illustrate means and process for automatic coloring of concrete, for the production of building material, like self-locking blocks, tiles and bent tiles in cement, sheets, blocks or hollow bricks in cement etc., comprising a batching unit (1) composed of various microbatchers (2), preferably with Archimedean screw and with loading hopper (2′), positioned above a conveyor belt (3), with sides (4), supported by a weighing system (5) preferably of electronic type.

In the hoppers (2′), separated from each other, are loaded the different basic products, for example: iron oxide, chrome oxide etc.

With the use of a normal computer, not illustrated, the microbatchers (2) can be programmed in opening and closure on the basis of the preestablished mixes.

At their opening, the microbatchers (2) discharge in the underlying conveyor belt (3) the desired quantity of product contained in the corresponding loading hoppers (2′). According to the color programmed, on the conveyor belt (3) can be discharged oxides from one or more microbatchers (2), whose opening and closure is governed by the quantity of product discharged, weighed directly by the underlying system (5).

Once the required batches of oxide powders have been prepared, the conveyor belt (3) discharges everything into a container (6), preferably constructed in stainless steel, in which is positioned a mechanical mixer (7) with motor (8).

The mixer (7) is equipped with a plurality of rotating blades positioned at different heights, preferably but unbindingly constructed in PVC or similar materials.

Inside the container (6), the oxide powder/powders are mixed and prediluted in a preestablished batch of water and regulated automatically according to the program established previously and inserted in the operator's control computer.

The water is inserted in the same container (6) through the channel (9). The opening and closing of the feed valve (10) of the water is regulated automatically by means of the programmed computer.

While the above predilution phase of the dry oxides in powder, in water, is taking place in the container (6), in a standard concrete mixer, positioned downstream from the drain pipe (11 and not illustrated as of known type, a required quantity of cement and aggregates is inserted, and their established mixing phase starts.

At the end of said cement-aggregates mixing phase, whose time is also programmed, the concrete mixer needs water and it reaches it through the drain pipe (11) of the container (6). In substance, the first water that reaches the concrete mixer is that in which the coloring oxides have already been prediluted.

Subsequently, to the cement-aggregates-prediluted oxides mix, generated in the concrete mixer, is added a second batch of water, preestablished, necessary to complete the preparation of the colored concrete.

Also this second batch of water is discharged from the channel (9) through the valve (10); before reaching the concrete mixer to complete preparation of the colored concrete, it is discharged in the container (6) exercising a washing action, which continues during discharge through the valve (12), the pump (13) and the drain pipe (11).

The feed valves (10) and drain valves (12) are preferably of pneumatic type, while the circulating pump (13) is preferably of pneumatic type with diaphragm.

Finally, when all the second batch of water has been discharged into the concrete mixer, the entire predilution plant of the oxides positioned upstream is perfectly washed and ready to be used for other mixes, with possible different ratios of the components and even with different components, while the same washing liquid is not drained in sewer but used to advantage to complete the colored concrete being prepared in the concrete mixer.

At this point, the colored concrete is ready to be discharged from the concrete mixer on the belts, towards vibrating forms and to the presses for the formation of the finished products, while the mixing and predilution plant of the colored oxides is ready to be re-used according to any other formula and/or color or shade.

Claims

1) Means and process for automatic coloring of concrete usable for the production of material for the building trade, like self-locking blocks, tiles and bent tiles in cement, sheets, blocks or hollow bricks in cement and the like, characterized by the fact of comprising a plant, positioned upstream of the concrete mixers, composed of at least one plurality of microbatchers (2), with loading hoppers (2′), positioned in alignment and above a weighing system (5), whose discharge side is aligned to the mouth of a container (6), with mixer (7) with motor (8), in which lead at least one water supply channel (9), with valve (10), and at least one on-off valve (12) and one circulating pump (13); said channel (11) discharging directly in the concrete mixer positioned downstream from the plant.

2) Means and process according to claim 1 characterized by the fact that all the members are operated and controlled by a programmable computer.

3) Means and process according to claims 1 and 2, characterized by the fact of comprising sequential phases of:
discharge of the batches of coloring oxides, or similar, from the microbatchers (2) on the conveyor belt (3);
weighing of the batches discharged, with weighing system (5); discharge of the batches by means of conveyor belt (3); collection of the batches and predilution of same with water, in container (6) with mixer (7) with motor (8); discharge of the prediluted mixes from the container (6) to the concrete mixers, containing the mixes of concrete and aggregates, through drain valve (12), pump (13) and channel (11); washing of the container (6), of the valve (12), of the circulating pump (13) and of the channel (11) with water batched and prepared for the completion of the final mix of the colored concrete.

4) Means and process according to claims 1, 2 and 3, characterized by the fact that the microbatchers (2) are of type with Archimedean screw and that their overlying loading hoppers (2') form an equal number of separate tanks for the various qualities of coloring oxides or products for concrete.

5) Means and process according to claims 1, 2 and 3, characterized by the fact that the weighing system (5) is of electronic type.

6) Means and process according to claims 1, 2 and 3, characterized by the fact that the mix container (6) is in stainless steel and the mechanical mixer (7) comprises a plurality of rotating blades in plastic PVC material or in other suitable material.

7) Means and process according to claims 1, 2 and 3, characterized by the fact that the feed valves (10) and drain valves (12) are pneumatic.

8) Means and process according to claims 1, 2 and 3, characterized by the fact that the circulating pump (13) is pneumatic with diaphragm.

9) Means and process for automatic coloring of concrete according to the previous claims, as illustrated and descrived and for the objects specified.

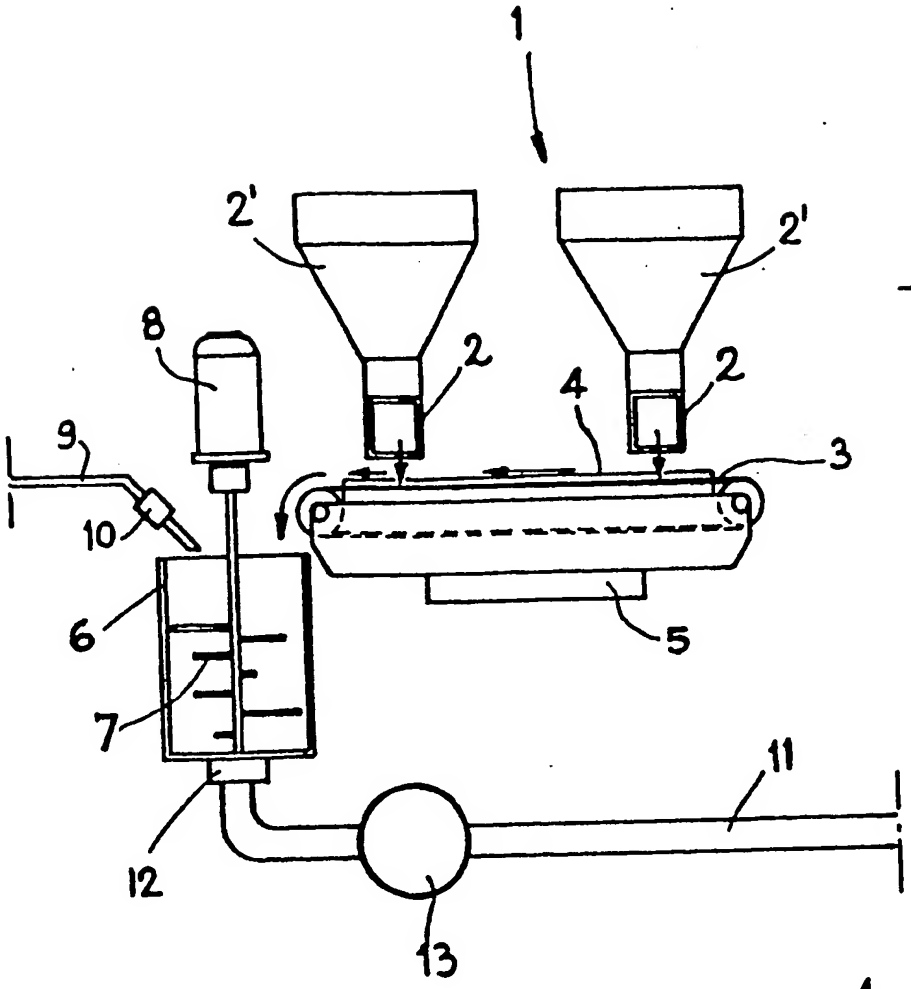

Fig. 1

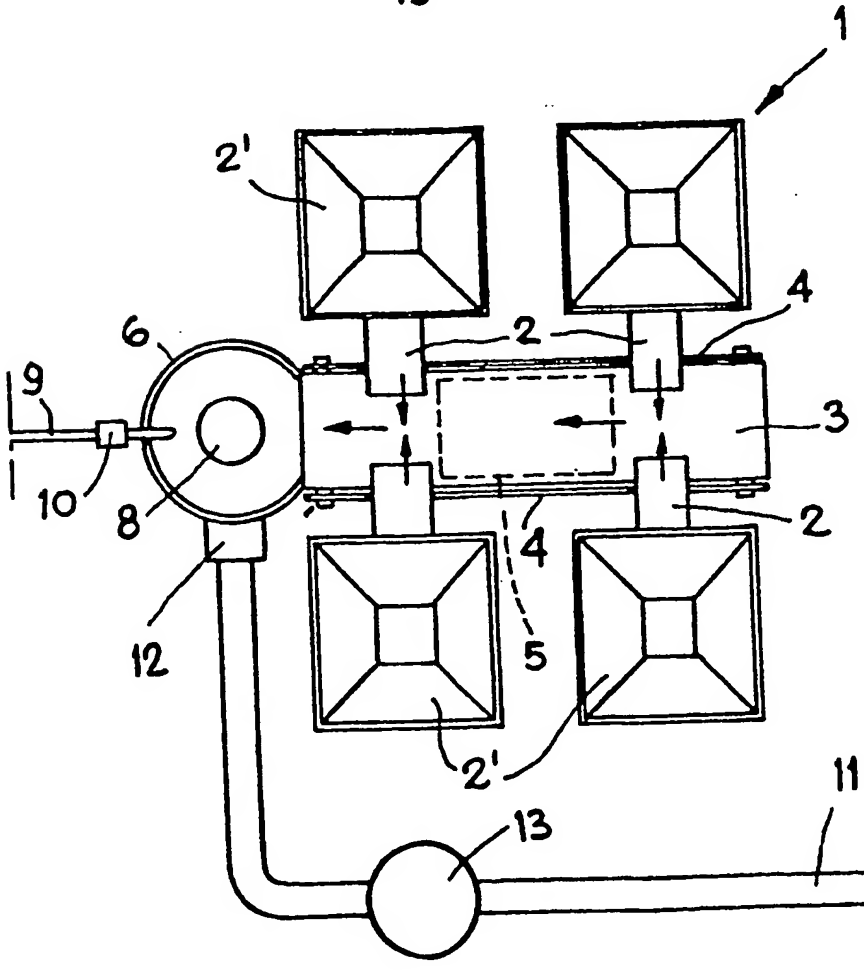

Fig. 2

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 90 10 7133

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
Y	US-A-3 994 404 (KISOVEC) * Abstract; fig. *	1-9	B 28 C 7/00 B 28 C 9/00
Y	PATENT ABSTRACTS OF JAPAN, vol. 9, no. 74 (C-273)[1797], 3rd April 1985; & JP-A-59 209 632 (SHINNIHON GIJUTSU CONSULTANT K.K.) 28-11-1984	1-9	
A	DE-C-3 436 813 (ELBA-WERK) * Abstract; fig. *	1-9	
A	US-A-2 719 030 (PEARSON) * Fig. *	4	
A	DE-A-3 127 401 (PACIFIC)		
A	US-A-4 304 493 (FRANKIE)		

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

B 28 C
B 01 F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	31-07-1990	PEETERS S.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P0401)